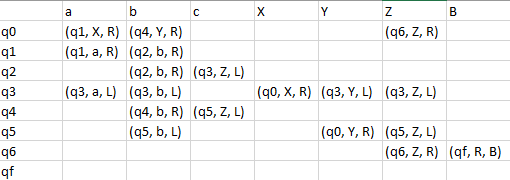
a^n, b^n c ^2n >= 1

|a|abbcccc  
|X|abbcccc  
Xabb|c|ccc  
Xabb|Z|ccc  
X|a|bbZccc  
…  
XXbbZZcc  
  
XX|b|bZZcc  
XX|Y|bZZcc  
XXYbZZ|c|c  
XXYbZZ|Z|c  
…  
XXYYZZZZ

change “a” to “X”  
move right to the first “c”  
 if none, reject  
change “c” to “Z”  
move left to the leftmost “a”  
repeat until there are no more “a”

change “b” to “Y”  
move right to the first “c”   
 if none reject  
change “c to “Z”  
move left to the leftmost “b”  
repeat until there are no more “b”  
make sure no more “C” remain  
  
(q0, a) = (q1, X, R) //replaces the pivot point with X  
(q1, a) = (q1, a, R) //moves pivot through all of the a’s  
(q1, b) = (q2, b, R) //when a’s end and we find the b’s  
(q2, b) = (q2, b, R) //move pivot through all of the b’s  
(q2, c) = (q3, Z, L) //when we find the 1st c we replace the value at that pivot with Z  
(q3, Z) = (q3, Z, L) //traverse left though all of the Z’s  
(q3, b) = (q3, b, L) //b’s  
(q3, Y) = (q3, Y, L) // Y’s  
(q3, a) = (q3, a, L) // a’s  
(q3, X) = (q0, X, R) //stop when we find leftmost X  
// loops until all the a’s are gone so the line is XXbbZZcc

(q0, b) = (q4, Y, R) //if the pivot is at b, replace it with Y  
(q4, b) = (q4, b, R) //move right through all the b’s  
(q4, c) = (q5, Z, L) //when pivot find the leftmost c we make it Z  
(q5, Z) = (q5, Z, L) //move left though all of the Z’s  
(q5, b) = (q5, b, L) //move left though all the b’s  
(q5, Y) = (q0, Y, R) //when we hit the right most Y  
//loops until all the b’s are gone  
(q0, Z) = (q6, Z, R) //when there’s no more b’s the string should be finsihed  
(q6, Z) = (q6, Z, R) //move the pivot right through all the Z’s. there should only be z’s at this poit  
(q6, B) = (q6, R, B) //reach final state



answer for a^n, b^n, c^n, n >= 1

(q0, a) = (q1, X, R)   
  
(q1, a) = (q1, a, R)  
(q1, b) = (q2, b, R)  
  
(q2, b) = (q2, b, R)  
(q2, c) = (q3, Z, L)

(q1, Y) = (q1, Y, R)

(q3, Z) = (q3, Z, L)  
(q3, Y) = (q3, Y, L)  
(q3, b) = (q3, b, L)  
(q3, a) = (q3, a, L)   
(q3, X) = (q0, X, R)   
  
(q0, Y) = (q4, Y, R)  
(q4, Y) + (q4, Y, R)  
(a4, Z) = (q4, Z, R)  
(q4, Z) = (q4, R, B)

a^n, b^n n >=1

change leftmost “a” to “X”  
move right until found “b”  
 if none reject  
replace “B” with Y  
move left until leftmost a is found  
repeat above steps until no more “a”  
make sure no more “B”  
 if yes reject  
  
(q0, a) = (q1, X, R)  
(q1, a) = (q1, a, R)  
(q1, b) = (q2, Y, L)  
(q1, Y) = ( q1, Y, R)  
  
(q2, a) = (q2, a, L)  
  
(q2, X) = (q0, X, R)  
(q2, Y) = (q2, Y, L)  
(q0, Y) = (q3, Y, R)  
(q3, Y) = (qf, Y, R)  
(q3, B) = (qf, B, R)